

REMARKS

Reconsideration of this application is respectfully requested in light of the above amendments and following remarks. Claims 1 – 7 and 12 – 18 remain in the application.

I. Claims 1-7 and 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitazawa et al. (JP '403) in view of biang et al. (US '883) or Toncich (US '251). Applicant has amended claims 1 and 12 as follows:

1. (Currently Amended) A voltage-controlled tunable filter, comprising:
 - a plurality of coaxial combline resonators including coaxial cavities filled with high dielectric constant material;
 - at least one of said plurality of coaxial combline resonators includes and at least one metallized through-hole;
 - an input/output coupling metallization on at least one surface of said plurality of coaxial combline resonators;
 - at least one voltage tunable dielectric varactor associated with said plurality of coaxial combline resonators; and
 - an iris with an aperture connecting said plurality of coaxial combline resonators.

12. (Currently Amended) A method of using voltage to control a tunable filter, comprising the steps of:
 - providing a plurality of coaxial combline resonators;
 - said plurality of coaxial combline resonators include at least one metallized through-hole and an input/output coupling metallization on at least one surface of said plurality of coaxial combline resonators and wherein said coaxial combline resonators include coaxial cavities filled with high dielectric constant material;

varying the capacitance of a capacitor by using at least one voltage tunable dielectric capacitor associated with at least one coaxial combline resonator of said plurality of coaxial combline resonators; and

connecting said plurality of coaxial combline resonators with an iris.

Applicant submits that none of the cited art includes, teaches or suggests, alone or in combination, at least the element “resonators including coaxial cavities filled with high dielectric constant material” and therefore Applicant believes this rejection has been traversed.

The office action took the position that Kitazawa et al. (figs. 1-3) discloses a coaxial combline filter comprising: a plurality of coaxial combline resonators; at least one of the plurality of coaxial resonators includes at least one metallized through-hole 12a, 12b; an input/output coupling metallization 14a, 14b on a surface of the plurality of coaxial resonators; and an iris with an aperture connecting the plurality of coaxial resonators 15a, 15b. The office action did state that Kitazawa et al. does not show at least one voltage tunable dielectric varactor associated with the plurality of coaxial resonators, but that Liang et al. discloses a tunable filter having voltage tunable dielectric varactors (figs. 8 and 9) coupled to resonators (different types of resonators can be used, col. 6, lines 35-44) for fast tuning, low insertion loss and high Q values, etc. (col. 6, lines 35 - 67).

Moreover, the Office Action continued, Liang et al. teaches tunable duplexers/filters could be used to replace fixed duplexers/filters to cover larger frequency bands and provide better selectivity. Also, the Office Action stated that Liang et al. shows a tunable dielectric film 106 on a low dielectric constant substrate 102 (figs. 8 and 9) and Toncich discloses a tunable filter having voltage tunable dielectric varactors coupled to resonators 404, 408 (e.g., coaxial resonator, col. 14, lines 43-51) for low insertion loss (col. 3, lines 4-11). Thus, the Examiner felt it would have been obvious to one of ordinary skill in the art to provide a voltage tunable dielectric capacitor of Liang et al. or Toncich coupled to resonators in the device of Kitazawa et

al, to tune filter frequency for fast tuning, low insertion loss, high Q values as taught by Liang et al. (col. 6, lines 35-67 and col. 110, lines 20-35) or Toncich .

Applicant submits that amended claims 1 and 12, with the addition of the element including coaxial cavities filled with high dielectric constant material, are not disclosed or inferred in any of the cited references and thus these amended independent claims and claims that depend therefrom would not be rendered obvious by the cited art.

Applicant submits that even if the present claims 1 and 12 had not been amended, the Examiner could not satisfy the basic requirements of a prima facie case of obviousness by combining Kitazawa with Liang or Toncich to reject pending independent Claims 1 and 12 and the remaining associated dependent claims. For the Examiner to establish a prima facie case of obviousness there must be some suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the references. In Kitazawa there is no suggestion or motivation provided of using voltage tunable dielectric varactors. In Liang and Toncich although there were suggestions that they could be used to improve filter performance in general, there is no suggestion on using them with a block filter such as provided in the present invention. Said another way, it is not “plug-and-play”, nor obvious to one of ordinary skill in the art to simply place voltage tunable dielectric varactors into a block filter to enable block filter tuning. Indeed there were unforeseen challenges in doing so and unexpected benefits of doing so that could not have been anticipated without a great deal of experimentation and research and development. For example, some of the unique factors that had to be considered and researched in using voltage tunable dielectric varactors in the block filter (and not present in tunable filters provided by Liang and Toncich) of the present invention were the effect of the metallized through-hole on the variable capacitance provided by the voltage tunable dielectric varactor; as well as the effect that the input/output coupling metallization on at least one surface of said plurality of coaxial combline resonators had on the voltage source provided to the voltage tunable dielectric varactor as well as the effect it had on variable capacitance. Further, it was not known and concerns lingered and needed to be

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researched on how the voltage tunable dielectric varactor would effect the coupling of the resonators via the iris with an aperture connecting said plurality of coaxial combline resonators. Said another way, there was no road map provided by Kitazawa, Liang and Toncich that would address these concerns or suggest the combination of these references.

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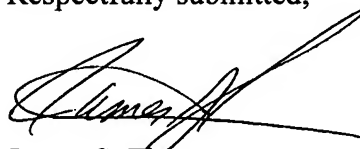
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CONCLUSION

It is respectfully submitted that, in view of the foregoing amendment and remarks, the application is in clear condition for allowance. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. 1.16 or 1.17 to Deposit Account No. 502697. The Examiner is invited to contact the undersigned at 202-607-4607 to discuss any matter regarding this application.

Respectfully submitted,



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